VDOT
Virginia Department of Transportation

GPS and RFID Advanced Technology Program

Matt McLaughlin
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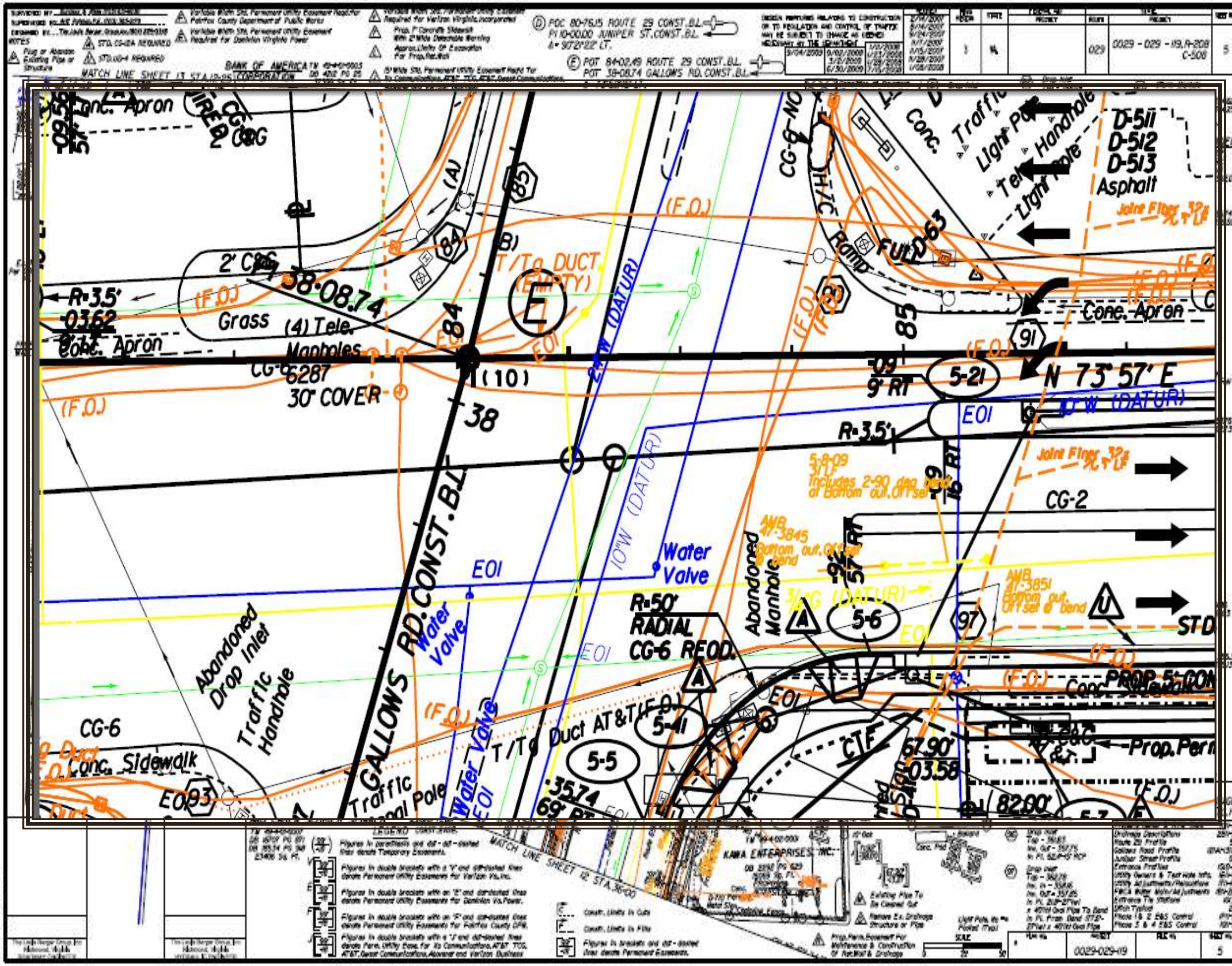
Virginia Department of Transportation

Various Field Issues

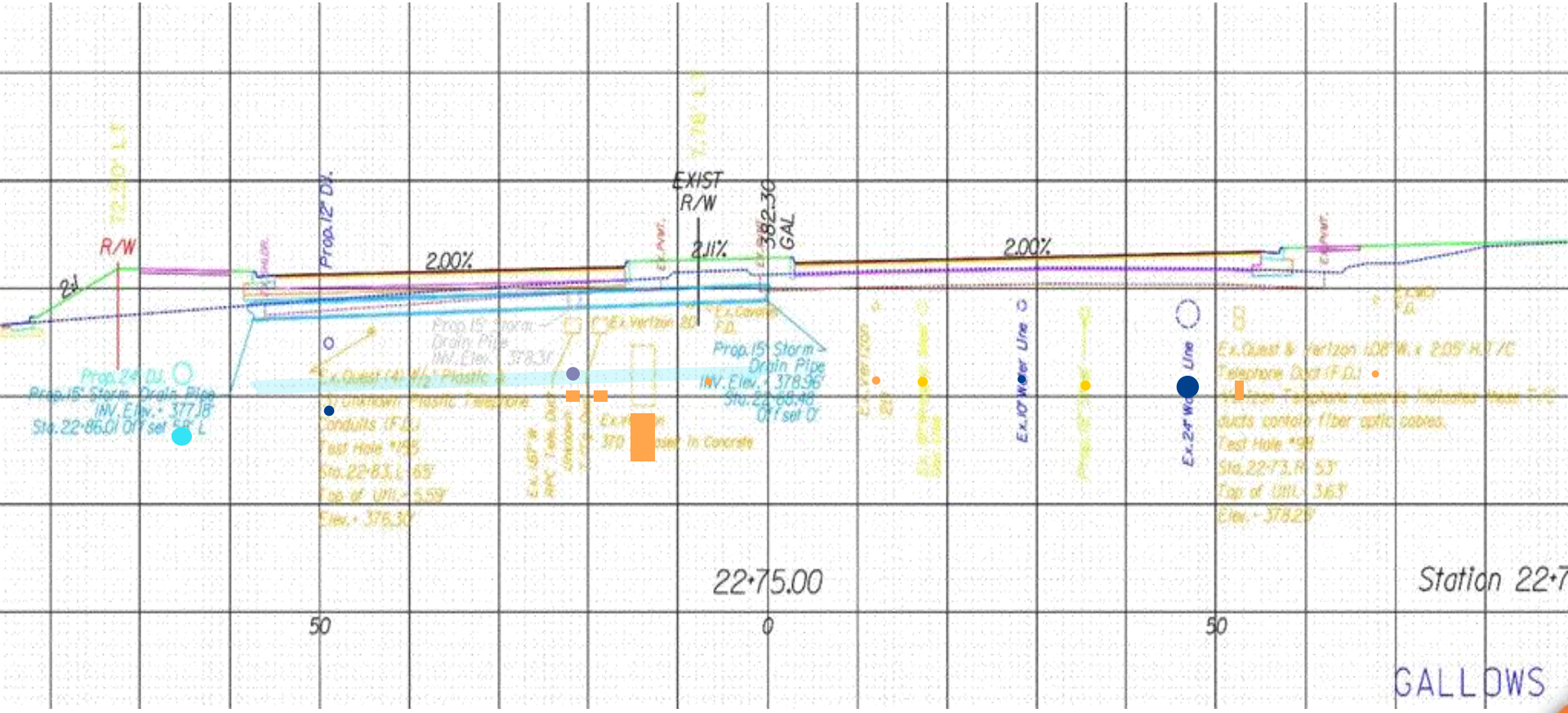
Miss Utility Marks

Rte. 29/Gallows Rd.



MATCH LINE SHEET 13
BANK OF AMERICA
PDC 80-7615 ROUTE 29 CONST.B.L.
PI 10+00.00 JUNIPER ST.CONST.B.L.
POT 84+02.49 ROUTE 29 CONST.B.L.
POT 38+08.74 GALLOWS RD.CONST.B.L.
0029 - 029 - 119, R-208
C-506
Conc. Apron
2' C&G
Grass
(4) Tele. Manholes
6287
30" COVER
38+08.74
T/Ta DUCT (EMPTY)
(F.O.)
R-3.5'
-03.62
Conc. Apron
CG-6
(10)
38
84
85
E
E
EOI
12" W (DATUR)
10" W (DATUR)
Ramp
FULL D-63
CG-6-NO
Conc.
Traffic Light Pole
Tele. Handhole
Light Pole
D-511
D-512
D-513
Asphalt
Joint Fiber 3.2± ⁄ C T LF
Conc. Apron
91
N 73° 57' E
-09
9' RT
5-21
R-3.5'
Joint Fiber
5-8-09
3/LF
Includes 2-90 deg. bend at Bottom out.Offset
CG-2
AMB 47-3845
Bottom out.Offset @ Bend
57' RT
Water Valve
EOI
AMB 47-3851
Bottom out. Offset @ Bend
3/4"G (DATUR)
R=50' RADIAL
CG-6 REQD.
Abandoned Manhole
5-6
97
STD
PROP. 5' CONC.
Conc. Sidewalk
GALLOWS RD.CONST.B.L.
Water Valve
Abandoned Drop Inlet
Traffic Handhole
CG-6
Conc. Sidewalk
93
Traffic Signal Pole
Water Valve
T/Ta Duct AT&T (F.O.)
5-41
5-5
-35.74
69' RT
CTF
67.90'
-03.58
82.00'
Prop. Perm
MATCH LINE SHEET 12 STA.36+00
KAWA ENTERPRISES, INC.
0029-029-119

X-Section 22+75.00



GPS/RFID Pilot Program

- **RFID will provide pertinent information to Utility Owners, Locators, Excavators, and Design Engineers.**
- **Assigns each programmable RFID tag with GPS coordinates for mapping and locating purposes.**
- **Compiles relocated or newly installed utility information for reference.**
- **RFID tags have proven to aid in the accuracy of utility locating in both vertical and horizontal aspects.**
- **Provides pertinent information to the Excavator for test pitting purposes that is normally unknown**

Does not supersede any Miss Utility Laws

Protocol for RFID Marker Installation

Install RFID tags on relocated facilities:

- **Every 25’ for metallic and non-metallic pipes.**
- **Every horizontal, vertical directional change, critical existing utility crossings, service connections, and abandoned facilities.**

Install RFID on existing facilities during test pit operations.

Programmable RFID tags provide vital information about the facility (Owner, Type, Elevation, etc.).

During utility construction, the as-build information is provided to the Utility Owners on a monthly basis for progress reporting.

At the end of relocation efforts, a complete facility as-build can be provided to the Utility Owner in the requested format for record updates.

RFID Marker Installation Process

Step 1

Transfer template from the PC to the RFID locator

Step 2

Program Ball which transfers information from the locator to the RFID Marker

Step 3

Install RFID Marker above utility

Abandoned Facilities Verified

Overview of Benefits

- Enhances damage prevention and public safety throughout the Commonwealth of Virginia.
- Conveys the knowledge obtained from the VDOT design and field operations to the Utility Owners.
- Enables utility companies to work together.
- RFID tags become the backbone of the GPS system and provides specific information for future use by the Contractors, Locators and Designers.
- Creates a linear GPS segment that can be used to establish the zone of protection for the specific utility when construction equipment is outfitted with GPS enabled digging trigger mechanisms

Does the use of the advanced technologies increase the accuracy of the underground utility locates?


Yes
RED
TEE

RT TR


Actual
RF ID
BEND


FCW
45°
BEND
Ryder
13 10:04AM


Survey
10' offset

Mapping Solutions utilizing GPS and RFID technologies

Shea Ridings
On-Time Utility Solutions

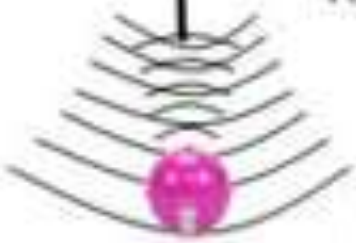
Marker ID + GPS Coordinates

GPS running Trac-ID Software

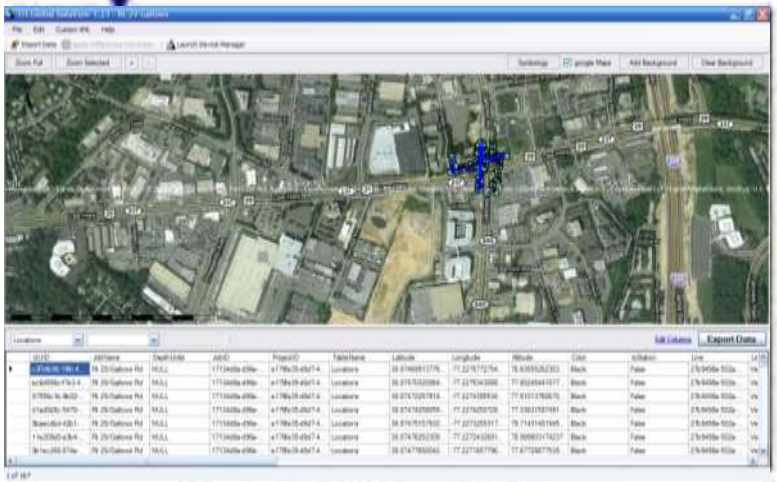
Data Collected in NUAG prescribed format

Data Synchronization with Exor Spatial Database

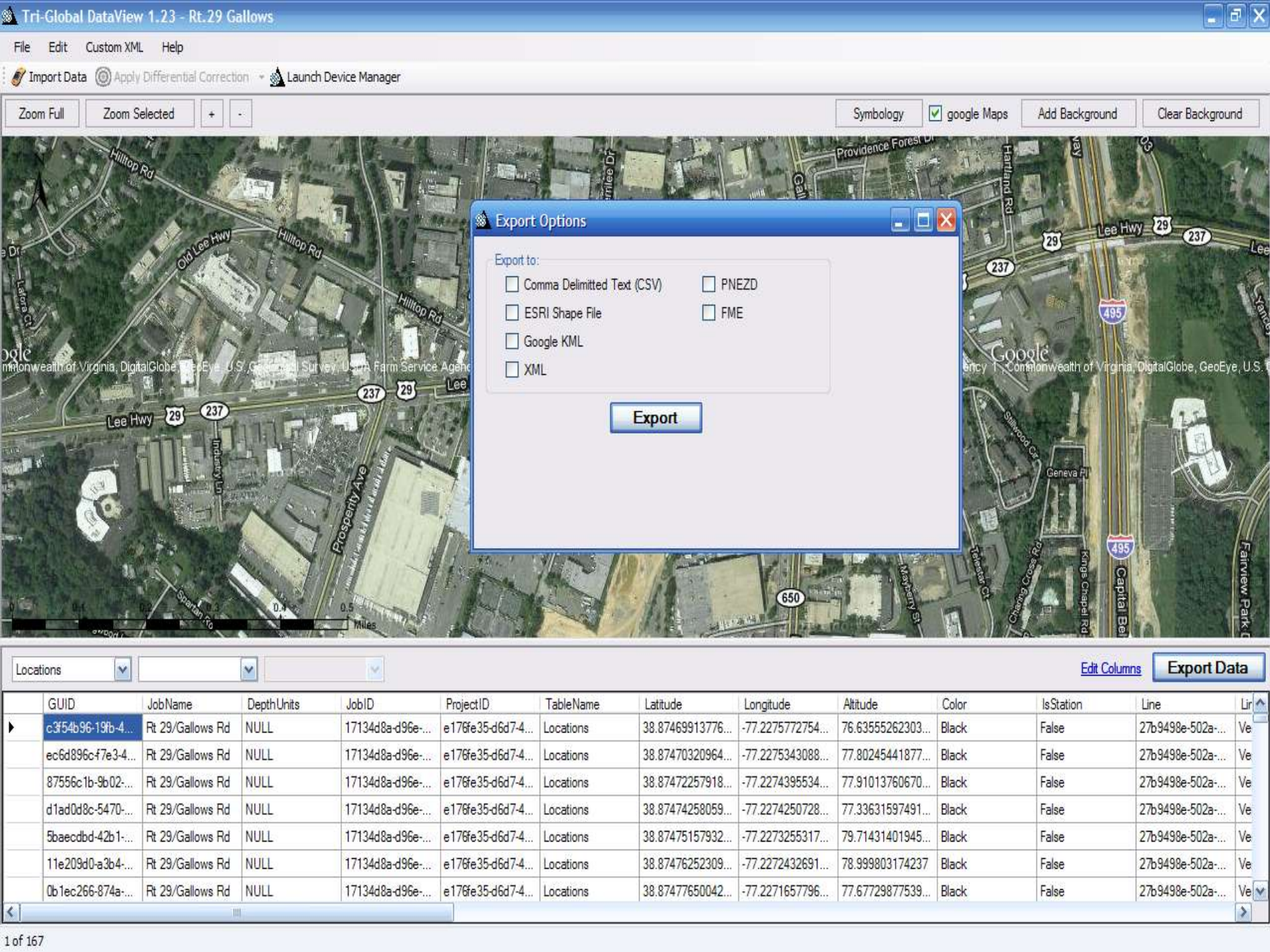
ID Marker Read



RFID Marker



Hosted, shared data


Tri-Global DataView 1.23 - Rt.29 Gallows
File
Edit
Custom XML
Help
Import Data
Apply Differential Correction
Launch Device Manager
Zoom Full
Zoom Selected
+
-
Symbology
google Maps
Add Background
Clear Background
Export Options
Export to:
Comma Delimitted Text (CSV)
ESRI Shape File
Google KML
XML
PNEZD
FME
Export
Hilltop Rd
Old Lee Hwy
Lee Hwy
Prosperity Ave
Industry Ln
Providence Forest Dr
Harland Rd
Stillwood Ct
Geneva Pl
Chasing Cross Rd
Kings Chapel Rd
Capital Bel
Fairview Park
Google
Locations
Edit Columns
Export Data
GUID
JobName
DepthUnits
JobID
ProjectID
TableName
Latitude
Longitude
Altitude
Color
IsStation
Line
c3f54b96-19fb-4...
Rt 29/Gallows Rd
NULL
17134d8a-d96e-...
e176fe35-d6d7-4...
Locations
38.87469913776...
-77.2275772754...
76.63555262303...
Black
False
27b9498e-502a-...
ec6d896c-f7e3-4...
38.87470320964...
-77.2275343088...
77.80245441877...
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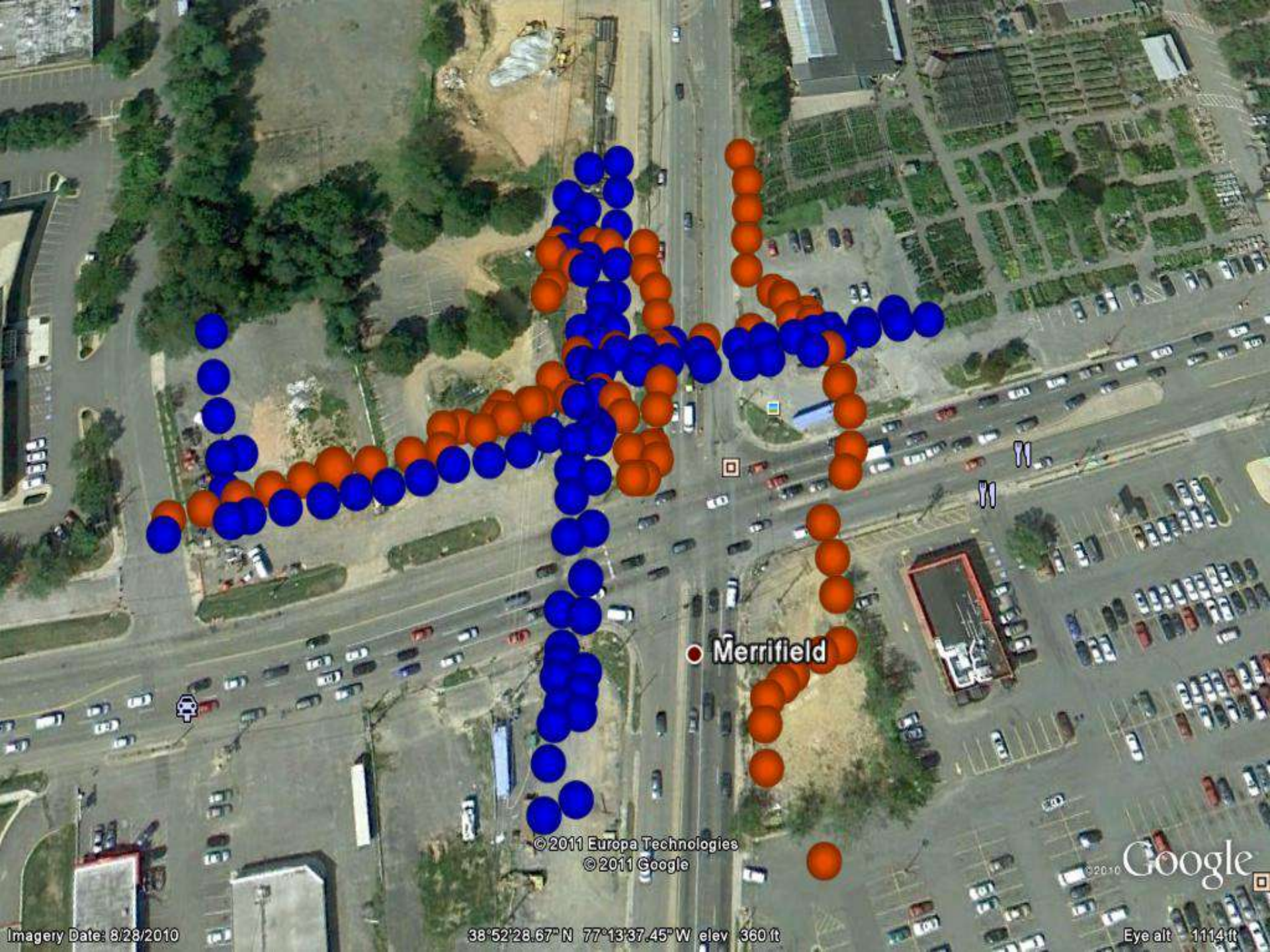
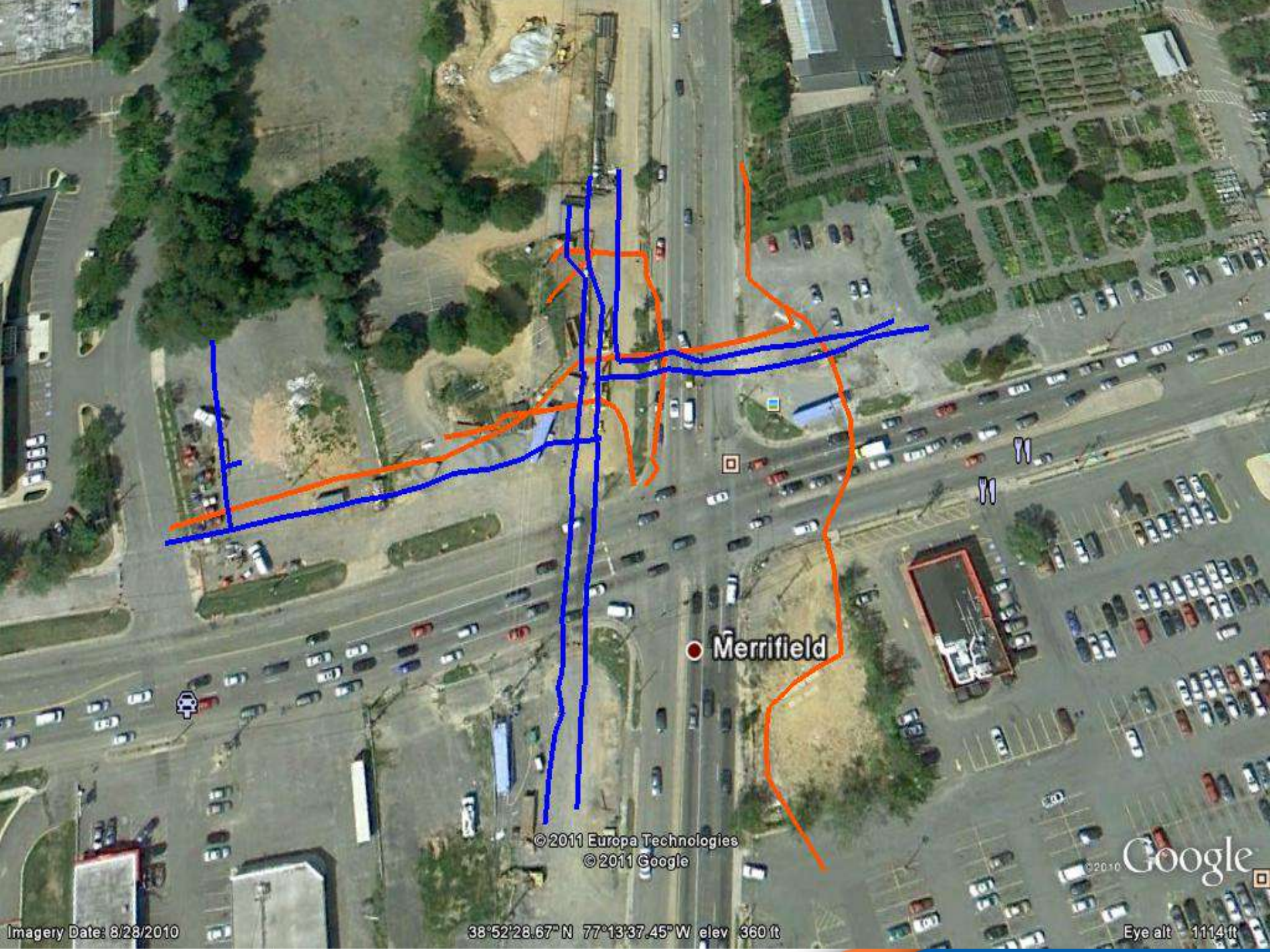

Merrifield
©2011 Europa Technologies
©2011 Google
©2010 Google
Imagery Date: 8/28/2010
38°52'28.67" N 77°13'37.45" W elev 360 ft
Eye alt 1114 ft


Merrifield
© 2011 Europa Technologies
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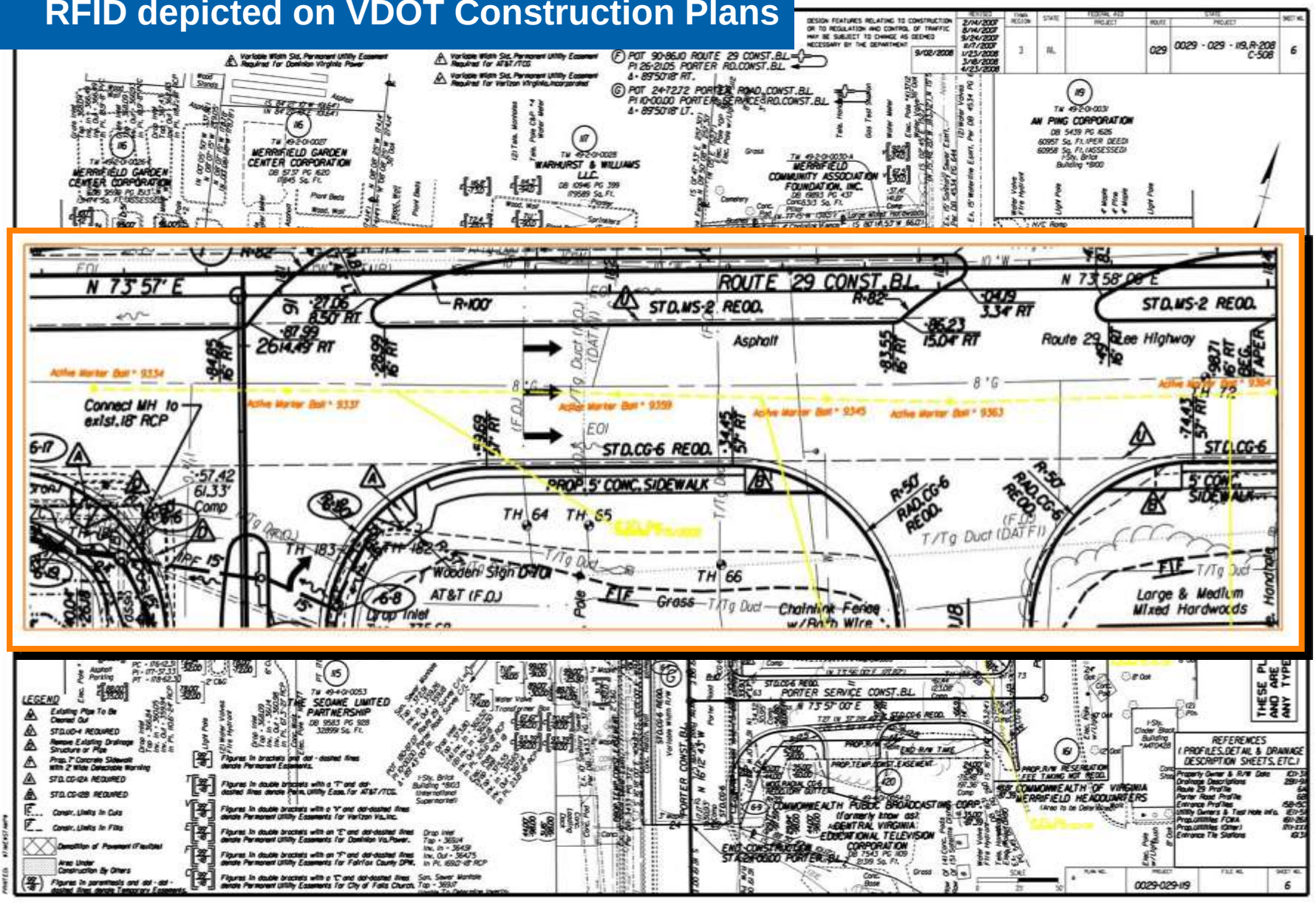
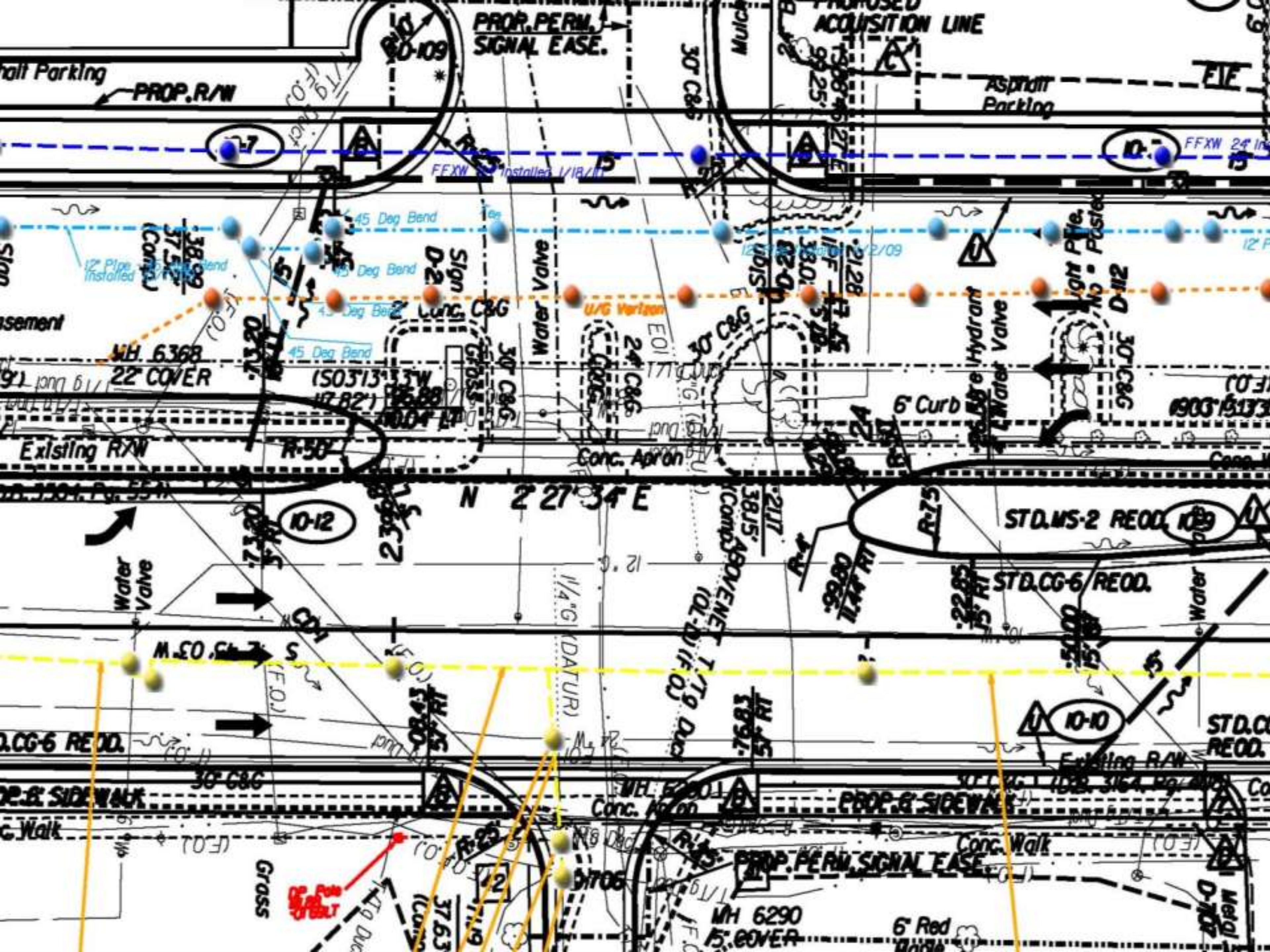
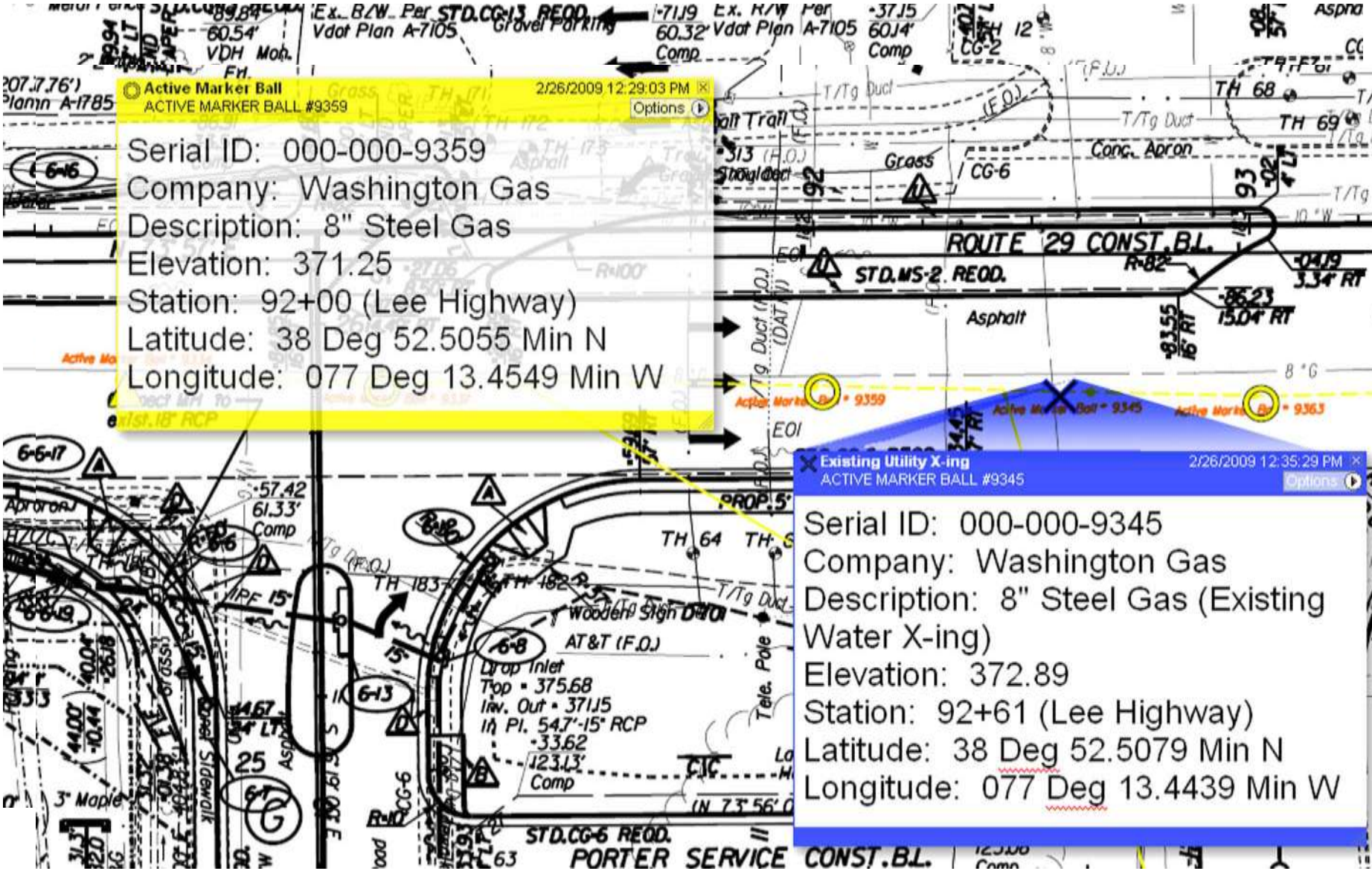
Imagery Date: 8/28/2010
38°52'28.67" N 77°13'37.45" W elev 360 ft
Eye alt 1114 ft

RFID depicted on VDOT Construction Plans

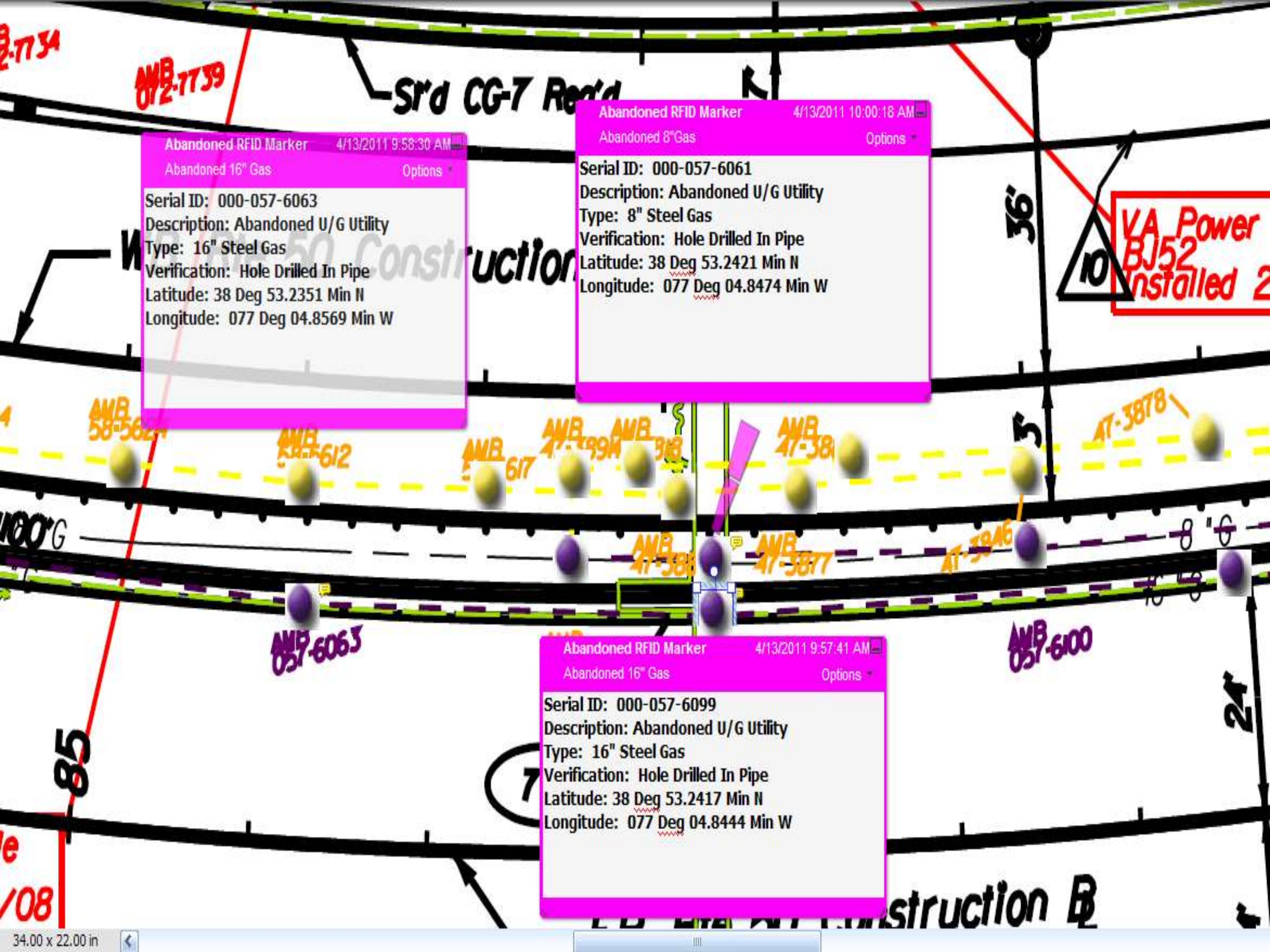



PROP.PERM. SIGNAL EASE.
ACQUISITION LINE
Asphalt Parking
PROP.R/W
FFXW
45 Deg Bend
12" Pipe Installed
U/G Verizon
MH. 6368
22" COVER
2' Conc. C&G
30" C&G
24" C&G
Water Valve
Fire Hydrant
6" Curb
Existing R/W
R=50'
Conc. Apron
N 2°27'34" E
10-12
STD.MS-2 REQD.
10-9
STD.CG-6 REQD.
10-10
Existing R/W
Conc. Walk
PROP.PERM.SIGNAL EASE.
Grass
MH 6290
6" Red

RFID: pop-up informational tags active in PDF files.




Marker Ball #000-073-8130
4/12/2011 2:24:56 PM
PWSA
Options
Serial ID: 000-073-8130
Company: PWSA
Description: 6" Sewer
Address: 7518 Linton Hall Road
Type: Clean Out
Latitude: 38 Deg 47.6922 Min N
Longitude: 077 Deg 36.8212 Min W
Marker Ball #000-073-8132
4/12/2011 2:24:56 PM
PWSA
Options
Serial ID: 000-073-8132
Company: PWSA
Description: 6" Sewer
Address: 7518 Linton Hall Road
Type: Tangent
Latitude: 38 Deg 47.7070 Min N
Longitude: 077 Deg 36.8057 Min W
Marker Ball #000-073-8124
4/12/2011 2:24:56 PM
PWSA
Options
Serial ID: 000-073-8124
Company: PWSA
Description: 6" Sewer
Address: 7518 Linton Hall Road
Type: Tee
Latitude: 38 Deg 47.7145 Min N
Longitude: 077 Deg 36.7886 Min W



Std CG-7 Req'd
Abandoned RFID Marker 4/13/2011 9:58:30 AM
Abandoned 16" Gas
Options
Serial ID: 000-057-6063
Description: Abandoned U/G Utility
Type: 16" Steel Gas
Verification: Hole Drilled In Pipe
Latitude: 38 Deg 53.2351 Min N
Longitude: 077 Deg 04.8569 Min W
Abandoned RFID Marker 4/13/2011 10:00:18 AM
Abandoned 8"Gas
Options
Serial ID: 000-057-6061
Description: Abandoned U/G Utility
Type: 8" Steel Gas
Verification: Hole Drilled In Pipe
Latitude: 38 Deg 53.2421 Min N
Longitude: 077 Deg 04.8474 Min W
VA Power
BJ52
Installed 2
36'
AMB 057-6063
AMB 057-6100
Abandoned RFID Marker 4/13/2011 9:57:41 AM
Abandoned 16" Gas
Options
Serial ID: 000-057-6099
Description: Abandoned U/G Utility
Type: 16" Steel Gas
Verification: Hole Drilled In Pipe
Latitude: 38 Deg 53.2417 Min N
Longitude: 077 Deg 04.8444 Min W
85
24'
34.00 x 22.00 in

New Initiatives

- Install programmable RFID tags during the preliminary engineering stage of the project when the existing utilities are designated as part of the beginning phase of the best value plan concept.
- VUPS, GTI, and VDOT are involved in an initiative to provide the RFID information to the locating community.
- Consideration is being made to implement this system into the Land Use Permit acquisition requirements.

Cost Analysis

Rt.29/Gallows Rd. Project

Possibilities with RFID Program

Total Utility Investment – $15M

Cost = $10,000

Costs includes:

- **Materials**
- **Programming**
- **Installation**

Possibilities without RFID Program

Damage
Repair of facility
Contractor down time
Delay to traveling public
Fire/Rescue/Police response
Lost revenue for property owner
Lost revenue for utility company

The average cost to install a 24” water main is approximately $145.00 per linear foot.

The cost to install RFID tags at a rate of 4 marker balls per hundred linear feet of pipe as previously specified increases the cost per linear foot by **$ 0.60**

Questions???

Contact Matt McLaughlin at:
Matt.McLaughlin@VDOT.Virginia.gov

or

Shea Ridings at:
sridings@ousLLC.com

the Energy to Lead

Damage Prevention Research at GTI

> Alicia Farag, GTI

> Virginia DPC

> April 26th 2011

gti

Project Overview

- Intelligent Utility System
- GPS Based Excavation Encroachment Notification
- Acoustic Plastic Pipe Locator
- VDOT Marker Ball Program

Intelligent Utility System

- Smart phones and tablets devices for field data collection for compliance
  - CP readings
  - Marker ball and RFID tag installations
  - HCA surveys
- Applications for Android and iPad/iPhone
- Incorporating supporting technologies
  - Touch screen, GPS, cameras, Bluetooth, RFID
- Leveraging cloud computing for temporary data storage
- Direct GIS integration methodology

GPS Based Excavation Encroachment Notification

- Phase 3A – GPS tracks excavation activity and creates a notification if digging is occurring outside of a valid one call ticket
- Phase 3B – GPS tracks bucket location and creates a notification if digging is occurring near a utility line
- New pilot project in New York and maybe Texas

Acoustic Plastic Pipe Locator

- Locates small diameter plastic pipe up to five feet deep
- Tested in various soil conditions
- Commercial agreement with Sensit Technologies

VDOT Marker Ball Program

- Other states interested in implementing similar programs

- Marker ball process is being incorporated into other research initiatives
  - Transportation Research Board project to develop a process to prevent excavation damage on DOT projects that result from inaccurate and outdated maps

Thank You!

Alicia Farag

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847-544-3492